STUDIES ON THE REELING PERFORMANCE OF COCOONS DAMAGED BY UZI MAGGOT

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ABSTRACT

Cocoons from three varieties [Pure Mysore, NB_4D_2 and crossbreed] were collected from grainages and cocoon market. Both normal and uzi infested cocoons were reeled using epprouvette at low speed. Filament length , number of breaks, loss of silk, reelability and denier were determined for both damaged and normal cocoons .The reeling of uzi infested cocoons was found to be unsuitable for producing quality silk.

Key words: *Bombyx mori L.*:(Pure Mysore, NB_4D_2, Crossbreed), cocoon, reeling, uzifly

INTRODUCTION

India is the only country in the world producing all the four types of commercially important silks namely mulberry, tasar eri and muga (Anonymous ,1992).

Mulberry silk, which is the best known of all types of silks, is produced by *Bombyx mori* L.Although all types of silkworm are susceptible to various diseases and attacked by different pests, *B. mori* is highly sensitive, probably because of the domestication since time immemorial. Of different types of pests, uzi fly (*Exorista bombyscis* Louis) is well known for its devastating effect on cocoon crop. The pest seems to have been detected in Karnataka during May 1980, when the seed cocoons were brought from West Bengal (Devaiah and Patil, 1986). Since then it has gradually spread over not only in Karnataka but also in the entire South India, attacking from third to fifth instar larva of *B. mori.*

Of all the stages of this pest, the maggot is more dangerous living as endoprasite and feeding on fat bodies, however, leaving silkglands unaffected (Krishnaswamy *et al.*,1978). If the eggs of the pest are laid on the body in the early period of larva, the host dies before spinning , but if deposition occurs at later stages, poor cocoon is spun and is damaged due to the emergence of maggot through the cocoon (Krishnaswamy *et al.,* 1972, Deviah and Patil 1986). The infestation by uzi fly results in marked reduction in the yield and quality of cocoons. However, there are diverse opinions among reelers about the nature of damage caused when the cocoons are pierced by the maggot. Hence, this study was conducted using a bivoltine (NB_4D_2) and a multivoltine (Pure Mysore race, besides a crossbreed (♀ Pure Mysore x ♂ NB_4D_2)

Table 1. Reeling performance of multivoltine, bivoltine and crossbreed cocoons

Parameter	Multivoltine			Bivoltine			Crossbreed		
	Uzi Infested	Control	t-test	Uzi Infested	Control	t-test	Uzi Infested	Control	t-test
Average Filament Length (m)	301	375	**	471	826	*	394	596	*
Average Number of Breaks	2.28	0.3	*	3.83	0.18	*	1.8	0.16	*
Silk Loss (%)+	19.83	-	*	42.9	-	*	33.9	-	*
Reelabiliy (%)	30.48	76.92	*	21.6	84.7	*	35.71	86.2	*
Denier	2.25	2.03	**	3.39	2.9	*	2.8	2.49	*
Cocoons Yielding Continous Filament (%)	18.00	82.00	*	4.00	88.00	*	26.00	90.00	*

+ Silk loss is calculated taking the control of each type as 100% * Significant at 1% level
** Significant at 5% level

MATERIALS AND METHODS

Silkworms of multivoltine (Pure Mysore), and crossbreed (♀ Pure Mysore x ♂ NB_4D_2) were reared on mulberry leaves of K_2 variety, 100 cocoons from each variety were selected at random for single cocoon reeling. This comprised of 50 normal cocoons and 50 damaged by uzi maggot. The damaged cocoons were stained from inside besides a hole. The deflossed cocoons were cooked for 2 to 4 min. approximately at 90° C. When the cocoons turned dull and attained soapy nature, they were brushed. Later, they were taken in a basin containing water at 45°C and reeled on an epprouvette at a low speed of 80 to 100 m per min.

Reelability of both control and damaged cocoons was found out using the formula;

$$\frac{\text{Total number of cocoons reeled x100}}{\text{Number of ends fed + number of breaks}}$$

The denier was calculated by applying the formula:

$$\frac{\text{Weight of reeled silk x 9000}}{\text{Length of reeled silk}}$$

The average number of breaks was determined according to the formula:

$$\frac{\text{Total number of breaks}}{\text{Total number of cocoons reeled}}$$

The data obtained from the above experiments were subjected to "t" test

RESULTS AND DISCUSSION

The results of reeling performance of both control and damaged cocoons from each variety are shown in Table 1. It is apparent from the table that the average length of filament is lesser in the uzi infested cocoons as compared to the control of all varieties. The multivoltine seems to be less damaged, whereas the bivoltine appears to be affected to a greater extent by uzi (Table 1). Though the control of all the varieties do show breakage of filament, the damaged cocoons exhibited significant ($p<0.01$) number of breaks. While in pure races amenable to large number of breaks do occur, the crossbreed show lesser breakages in terms of breaks per cocoon. But, as compared to respective controls, the breakages in multivoltine

were more than 7 fold, in bivoltine it was 21 fold while in crossbreed the breakage was 11 folds. It is also seen that the loss of silk (in filament length) is higher (42.8%) in bivoltine as compared to multivoltine (19.83%). It is also observed that the damaged cocoons of all varieties showed significant ($p<0.01$) reduction in the reelability when compared to that of respective controls. The damaged cocoons of NB_4D_2 race showed very poor (21.6%) reelability as compared to that of Pure Mysore (30.48%) as well as crossbreed (35.7%). Similarly, the denier of the affected cocoons is very high in NB_4D_2 (3.39), followed by crossbreed (2.8) and pure Mysore (2.25). In addition, the difference in denier between the control and uzi infested cocoons of NB_4D_2 race as well as crossbreed was found to be more significant as compared to that of pure Mysore. It is also observed that hardly 4% of the cocoons from NB_4D_2 , 18% from pure Mysore and 26% from crossbreed yielded continuous filament without any break. Some of the damaged cocoons of NB_4D_2 could not be reeled at all. The above result shows that the cocoons of all varieties, if damaged by maggot of uzi fly, do not yield quality silk as compared to the normal cocoons. Such a poor reeling performance may be attributed to the intertwining of silk fibres at the point of emergence of maggot and/or to the brittleness caused by the dead tissue of the worm on the inner surface of the cocoons. The intertwining of the silk filament near the hole and/or the brittleness in the stained region of the cocoons creates weakness of silk fibre, which might be responsible for more breakages during the reeling of damaged cocoons.

Shamachary (1990) reported that the average number of breaks was 2 in both uzi infested as well as good cocoons of ordinary cross, whereas the average number of breaks was 1 in uzi infested cocoons and 2 in good cocoons of multivoltine breed. Also, he observed that the purchase of uzi infested cocoons is not a loss to reelers. However, in our study we have observed increased breaks only in uzi infested cocoons and very low in good cocoons. The breaks lead to difficulty in reeling. This drawback can be counteracted to some extent only, if the uzi infested cocoons are mixed with the normal cocoons as proposed by Vijayendra et al., (1992). However, the economics of such damaged cocoons should be studied from the farmer's point of view also.

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